

***Faculty of Engineering & Technology***  
***P.K.University***  
***Shivpuri (MP)***



**Evaluation Scheme & Syllabus for  
Department Of Electronic Communication engineering**

**M. Tech .-( Digital Communication)  
(I to IV Semester)**

**(Effective from session 2019-20)**

# EVALUATION SCHEME

## M.TECH. Digital Communication Semester- I

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MTDC-101	Advanced Mathematics	30	70	NA	NA	100
MTDC-102	Micro Controller System Design	30	70	NA	NA	100
MTDC-103	DSP Application	30	70	25	25	150
MTDC-104	VLSI Design	30	70	25	25	150
MTDC-105	Data Communication And Computer Network	30	70	NA	NA	100

## Semester- II

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MTDC-201	System Programming	30	70	25	25	150
MTDC-202	Modeling and Simulation of Computer	30	70	25	25	150
MTDC-203	Network Design Technology	30	70	NA	NA	100
MTDC-204	Optical Network	30	70	NA	NA	100
MTDC-205	Mobile & Satellite Communication	30	70	NA	NA	100

## Semester- III

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MTDC-301	Dissertation phase-I	NA	NA	200	200	400
MTDC-302	Seminar-III	NA	NA	25	25	50

## Semester- IV

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MTVL-401	Dissertation phase-II	NA	NA	300	300	600

***Department of Electronics & Communication Engineering  
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I Year I Semester***

**MTDC-101: ADVANCED MATHEMATICS**

Solution of Partial Differential Equation (PDE) by separation of variable method, numerical solution of PDE (Laplace, Poisson's, Parabola) using finite difference methods, Elementary properties of FT, DFT, WFT, Wavelet transform, Haar transform.

Probability, compound probability and discrete random variable. Binomial, Normal, Poisson's distribution. Sampling distribution, elementary concept of estimation and theory of hypothesis, recurred relations.

Stochastic process, Markov process transition probability transition probability matrix, just and higher order Markov process, Markov chain. Queuing system, transient and steady state, traffic intensity, distribution queuing system, concepts of queuing models (M/M/1: Infinity/ Infinity/ FC FS), (M/M/1: N/ Infinity/ FC FS), (M/M/S: Infinity/ Infinity/ FC FS)

Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relation equations, fuzzy logics. MATLAB introduction, programming in MATLAB scripts, functions and their application.

Introduction and definition of reliability, derivation of reliability functions, Failure rate, Hazard rate, mean time t future & their relations, concepts of fault tolerant analysis, Elementary idea about decision theory and goal programming.

**Reference Books:**

1. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill.
2. Advance Engineering Mathematics by Ervin Kreszig, Wiley Easten Edd.
3. Applied Numerical Methods with MATLAB by Steven C chapra, Tata Mc Graw Hill.
4. Introductory Methods of Numerical Analysis by S.S. Shastry,
5. Introduction of Numerical Analysis by Forberg
6. Numerical Solution of Differential Equation by M. K. Jain
7. Numerical Mathematical Analysis By James B. Scarborough
8. Fourier Transforms by J. N. Sheddon
9. Fuzzy Logic in Engineering by T. J. Ross
10. Fuzzy Sets Theory & its Applications by H. J. Zimmersoms

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**MTDC-102: MICRO CONTROLLER SYSTEM DESIGN**

Review of 8-Bit and 16-bit microprocessor, support chips and interfacing techniques, single chip micro-computers, architecture, program and data memory, ports, input Output interfacing and programming,

Single chip micro controllers- INTEL 8051/ 8751, MOTOROLA 68HC0/68HC11 architecture, instruction set and programming, Memory mapping, addressing modes, Registers, expanded modes. Interrupt handling timing and serial I / O.

Software development Modular approach, integrated software development environment, Object oriented interfacing and programming, Recursion and debugging.

ATMEL 89C51 / 52 and PIC micro-Controllers- Case studies.

Design and application of Micro-Controller in Data acquisition, Embedded controllers, Process control

etc. DSP Processor architecture and sample design using TI – DSP.

**Reference Books:**

1. Embedded Systems 8051 By Majidi & Majidi
2. Design With Micro-Controllers By John P. Peatman Tmh
3. Embedded Micro-Computers System By Jonathan W. Valvano
4. Data Manuals – Intel Motorola

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**MTDC-103: DSP APPLICATION**

Review of Discrete time signals: sequences, representation. Discrete time systems: linear, time invariant, LTI systems, properties, and constant coefficients difference equations. Frequency Domain representation of discrete time signals and systems

Review of Z Transform – Properties, ROC, Stability, Causality, Criterion. Inverse Z Transform, recursive and Non Recursive systems, Realization of discrete time system

DFT: Properties, Linear and Circular convolution, Discrete Cosine Transform, Relationship between DFT and DCT. Computation of DFT: FFT/Decimation in Time and Decimation in Frequency

FIR and IIR systems: Basic structure of FIR and IIR, Bilinear Transformation, Design of Discrete time IIR filter-Butterworth, Chebychev, Inverse Chebychev, Elliptic etc. Design of FIR filters by windowing – Rectangular, Bartlett, Hann, Hamming, Kaiser, Window filter, Design method relationship of Kaiser to other window. Application of MATLAB for Design of Digital filter. Effect of Finite register length in filter Design

Discrete time Random signals: Discrete time random process, Averages, Spectrum Representation of finite energy signals, response of linear systems to random signals. power spectrum estimation: Basic principals of spectrum estimation, estimate of auto covariance, power spectrum, cross covariance and cross spectrum.

Advance signal processing technique and transforms: multi rate signal processing- down sampling/up sampling, introduction to discrete Hilberts Transform, Wavelet Transform, Haar Transform etc.

**Reference Books:**

1. Discrete time signal Processing by Oppenheim & Schaffer PHI 2nd Edition
2. Digital Signal Processing using MATLAB by S.Mitra
3. Digital Signal Processing By Proakis Pearson Education
4. Theory & application of Digital Signal Processing by L.R.Rabiner & B. Gold PHI

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**MTDC-104: VLSI DESIGN**

Introduction: Basic concept of integrated circuits and manufacturing, Design fundamental for digital CMOS circuits, Design Abstraction and circuit Validation.

CMOS circuit and Logic Design: CMOS Logic gate design, Basic Physical design, CMOS Logic structure, I/O Structure, Power and Delay consideration

System Design: CMOS Chip Design, standard cells, Programmable gate array, Design Capture, Simulation and Verification.

Subsystem Design: Data Operation, CMOS Sub System Design, Memory and Control Strategies, PLA and ROM Implementation

CAD system and Algorithms: CAD systems, Layout Analysis, Placement and Routing Algorithms, Timing Analysis, Optimization, Logic Synthesis and Simulation, Testability Issues.

**Reference Books:**

1. Principal Of Cmos Design: A System Prospective By Waste And Eshraghin
2. VLSI Design: System On Silicon, Pearson Education
3. VLSI Technology By Sze S.M. Tmh
4. Basic VLSI Design, System And Circuits By Pucknil D.A. Phi
5. Vhdl Primer By Bhaskar Star Galax Pub.

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**MTDC-105: DATA COMMUNICATION AND COMPUTER NETWORK**

Review of synchronous and asynchronous transmission, circuit switching, message switching, packet switching and their comparison, various detector techniques, parity check, vertical and longitudinal redundancy check and CRC code and their error detecting capabilities. RS-232 C and X.21 standards, modern operation, null model.

Data link control, point-to-point and multi-point links, flow control, sliding window protocol, various ARQ technique for error control and their comparison and performance analysis, HDLC as a bit oriented link control protocol.

Communication Network:- Virtual circuit and datagram, routing algorithm, dijkstra and Bellman ford least cost, algorithm, various routing protocol, congestion control technique, deadlock and its avoidance.

Local Area network:- Various topologies and medium access control schemes such as contention, polling, token parsing and performance analysis, various IEEE standards for LAN, UBS LANs, FDDI.

Introduction to WAN packet switching technologies such as ATM and Frame relay. Introduction to TCP / IP protocols.

**Reference Books:-**

1. Data And Computer Communication By W. Stalling Phi
2. Computer Networks Y Tanenebaum Phi
3. Telecommunication Network, Protocols, Modelings And Analysis By M. Schwartz
4. Local Area Network By Keiser Tmh

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**MTDC-201: SYSTEM PROGRAMMING**

Fundamental of programming, steps in problem solving with digital computer algorithm, flow chart and textual representation, primitive actions, control construct like conditional, iteration, conditional repetition, recursion, programming with Pascal of C

Data & Data types, data representation, data structure array-various operations with array, concept of pointers and pointers manipulations, pointers for data structures and functions, static and dynamic allocations, implementations with arrays and pointers, various operations like searching, appending, insertion & deletion in lists, doubly linked list and their implementations, stack,PUSH/POP & TOP of stack operation, applications of stacks, queues & various operations on queues, tree, binary and K-ary trees, tree traversal, insertion and deletion in tree, B-tree and AVL tree, operations on those tree applications

Searching and sorting, linear, binary and Hash search, minimum and maximum selection, divide and conquer, sorting, insertion sort, bubble sort, quick sort & heap sort, matrix operations, dynamic programming

Overview of system programs, Assembler, interpreter, compiler, Editor and operating system.

**Reference books: -**

1. Data structure & Program design by Kruze, PHI
2. Algorithms,Data structure & programs by Wirth N., PHI
3. The programming language by Kernighan & Ritchi, PHI 4.Introductory problem solving by pascal by Schieder,John Wiley



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**MTDC-202: MODELING AND SIMULATION OF COMPUTER**

Induction to Discrete event system simulation, its applications, advantages and disadvantages, system and system, environments and component of system, Discrete and Homogeneous system, modeling of system and type of models, Various steps in simulation, General concept in discrete event simulation.

Practical models in simulation: review of terminology and concepts, useful statistical models, discrete distributions, continuous distributions, Poisson process and empirical distribution.

Queuing model: Characteristics of queuing system transient and steady state behavior of queue, measures of performance using queuing systems property.

Random number and its generation: Properties of random numbers, distribution of pseudo random no, test for random no., Random variant Distribution, inverse transform technique, Direct transformation for normal distribution, Acceptance and rejection technique.

Modeling: Data Collection, identifying the distribution with data, parameter variation, goodness of fit tests, selection of input model without data, multivariate and input models.

Introduction and validation of simulation models: output analysis for single model, nature of output data, types of simulation with respect to output analysis, types of performance and their estimation, output analysis for terminating simulations, analysis for terminating simulation.

**Reference Books:**

1. Simulation Modeling and Analysis by
2. Modeling and simulation by Bank and Carson PHI
3. Network Modeling, simulation and analysis by Garcia and Garcia
4. Telecommunication Network: Protocols, Modeling and Analysis By M. Schwartz

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***I Year II Semester***

**MTDC-203: NETWORK DESIGN TECHNOLOGY**

Review of concepts of Layering and Layered models- OSI & TCP/IP LAN Technology, transmission Medium, Topology, Medium Access Control (MAC) Techniques including MAC& LLC sub layers,

LAN system, Ethernet system, Fast Ethernet& Gigabit Ethernet, Token Ring, FDDI Internet working with TCP/IP, Internet Protocol (IP) Suite including IP V4, IP V6 Transport Protocols, TCP and UDP

Introduction to IP routing, various interior gateways protocols like RIP, OSPF and exterior gateway protocols like BGP

Introduction to label Switching and MPLS WAN technology: WAN Vs LAN, Circuit switching mechanism and network design, packet switched networking including routing and traffic control, X.25 ISDN and Broadband ISDN: Overview, ISDN, interface and functions, layers and ISDN services-ISDN standards and services High Speed network frame relay, frame relay protocols, services and congestion control,

ATM: ATM adaptation layer (AAL), ATM traffic and congestion control ATM LAN, ATM LAN emulation and multi protocols over ATM (MPOA)

**Reference Books.**

1. Redia Pearlman, Interconnections, bridges, routers, switches and Int protocols Pearson Edu
2. Comer, Internetworking with TCP/IP Vol. I PHI
3. Tenenbaum, Computer Networks, PHI
4. Forouzan B, Data communication and networking, TMH.
5. Stalling W, Data and computer communications, PHI
6. Hardy, Inside networks, PHI
7. Glover and Grant, Digital Communication, PHI

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**MTDC-204: OPTICAL NETWORK**

Introduction to optical network: Telecommunication, first generation optical network, multiplexing technique, second generation optical network, virtual circuit services and data gram, transparencies of regenerator

Network components: couplers, Isolators, Circulators, Multiplexer , filter, fiber bragg gratings as ADD/Drop multiplexers, frabry perot filters, acoustics optical tunable filters, characterization of switches, mechanical, electro-optic, thermo-optic, and SOA switches, switching architecture.

First generation of optical network: SONET, SDH, goals of SONET design , Multiplexing in SONET, elements of SONET/SDH infrastructure, SONET physical layer, comuter interconnections, ESCON, fiber channel, FDDI, ATM, IP layered architecture , physical layer, data link layer, network layer, transport layer

Broad cast and select network: topologies for broadcast networks, bus topology, star topology, media access control(MAC) protocols, throughput calculation, synchronization, aloha and slotted ALOHA, test beds, LAMBDA NET, rainbow, starnet

Wavelength routing network: optical layer, wavelength cross connect, wavelength reuse reliability, virtual topology and circuit switching and node design, degree of wavelength conversion, network design and operation traffic models, and performance criteria, static and reconfigurable network, classification of light paths

Photonic packet switching , optical time domain multiplexing(OTDM), Method of multiplexing and demultiplexing, Broadcast , OTDM network , bit interleaving and packet interleaving, optical and gates non linear optical loop mirror, tera hertz optical asymmetric demultiplexer, switch based network, deflection routing

**Reference Books:**

1. Optical Networks: A practical Prospective By R.Ramaswamy and K.N.Shivrajan
2. Optical Networks By C.S.R.Murthy and M.Guruswamy, PHI
3. Computer Networks By Tanenbaum

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**MTDC-205: MOBILE & SATELLITE COMMUNICATION**

Review of wireless and cellular radio communication: The cellular concept, system design fundamentals, frequency reuse, reused distance, cluster size, channel assignment strategies, handoff strategies, co-channel interference and system capacity, trunking and grade of service.

Speech coding for wireless system applications and broadcast systems, coding techniques for audio and voice and popular speech codes. Brief introduction to radio channel characterization, multi-path propagation, co channel interference, exponential power delay profile, propagation effects, scattering, ground reflection, fading, long normal shadowing, coherence bandwidth

Modulation techniques for mobile and satellite communication, their generation and detection, performance of spectral and power efficiency. Physical layer technique, diversity, spread, spectrum, frequency hopping, direct sequence, adaptive equalization, Orthogonal Frequency Division Multiplexing (OFDM)

MAC Protocols; 802.11 and its variants, ETSI-HILARAN type 1 MAC protocol, multiple access with collision avoidance.

Introduction to GEO, MEO and LEO satellite systems, Antena positioning in GEO and Link calculations, wideband CDMA concepts principles.

**Reference Books.**

1. Wilkies and Garg, Principles of GSM technology, PHI
2. Schiller J., Mobile Communications, Addison Wesley
1. Viterbi A, CDMA, Addison Wesley
1. Gokhle, Introduction to Telecommunications, Delmer Thomson